Space Weather Forecast

Issued on Tuesday, 14 March 2023 at 01:28 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of G1/Minor Geomagnetic storms due to possible glancing coronal mass ejections day 2 (15th). S1/Minor Radiation storm from far-sided eruption now eased.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low with only isolated common class flares observed, the strongest from the eruption of a filament near the centre disc in the northern hemisphere. This is a line of plasma held together by the Suns magnetic field, and can be another source of coronal mass ejections. There are six numbered sunspot regions on the visible disc however these are all generally small, simple and mature regions that are either stable or showing signs of decay. The only exception is a seventh newly developing region in the southern centre disc. This is currently a small bipolar region, but has the potential for further development.

A moderately fast coronal mass ejection (CME) was associated with the filament eruption mentioned above at 13/1105 UTC. This has been analysed as largely passing to the north and ahead of Earth, however glancing influences are possible on day 2 (15th). A further very fast CME was observed at 13/0336 UTC, however this was from a significant far-sided eruption, moving away from Earth.

Solar Wind / Geomagnetic Activity: The solar wind has been slow during the past 24 hours, easing from 380 km/s to 310 km/s. The total magnetic field strength has been weak to Moderate, but with its north-south component predominately positive (northward). Geomagnetic activity was Quiet (Kp 0-1).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) increased from 13/0500 UTC in response to the large far sided CME, reaching the S1/minor storm level for brief spells. While currently below this threshold, they remain elevated at just below the S1 level.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is generally expected to be Low or Very Low, with isolated Common-class flares.

Solar Wind / Geomagnetic Activity: Glancing CME impacts are possible late day 1 (14th) and through day 2 (15th) due to three filament eruptions that occurred on the 10th, 12th and 13th. These are all low confidence, however any combined effect could give a larger geomagnetic response than normally expected from such glancing impacts. Otherwise, slow solar winds are likely to become slightly elevated later day 1 (14th) and through day 2 (15th) due to the arrival of fast winds from a coronal hole. Quiet geomagnetic activity at first day 1 (14th) is expected to become Quiet to Unsettled with a chance of Active intervals day 2 (15th) (Kp 0-4). The arrival of any CMEs will likely bring Active intervals with a chance of G1 Minor Storm intervals (Kp 4-5) with this risk continuing into day 3 (16th) before easing later with mainly Quiet (Kp 0-2) conditions returning by day 4 (17th).

Energetic Particles / Solar Radiation: The count rate of energetic particles is currently slightly

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elevated, and is expected to only gradually decline back to background levels.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	40	30	1
Strong	G3	No	1	2	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	5	5	5	5
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	10	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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